United States Department of State

Washington, D.C. 20520

September 11, 1985

MEMORANDUM

TO   : INR/EX - Mr. Robert MacCallum

FROM   : A/ISO - Day O. Mounty

SUBJECT: The INR Disconnect Plan

The ISO contractor, J. G. VanDyke and Associates, Incorporated (VDA), has completed a study of the plans presented by Mr. Don Hall, INR's contractor. The VDA study results which are attached included evaluation of three INR disconnect options.

The second and third options examined - the IBM hardware solution - have been ruled out by ISO at this time because of equipment space and power constraints and because of operating system requirements. At another juncture in the future these options might become viable.

With caveats, VDA agrees that the first option which was proposed by Mr. Hall has the capability of providing disconnect in the April, 1986 timeframe.

VDA believes that Mr. Hall's estimates for staffing, hence time estimates, needed to accomplish his plan are too low. They recommend a four member team to ensure timely completion. Also, VDA believes that the introduction of "enhancements" of existing function into the disconnect issue would endanger timely completion. The issue of any device attached to the INR system being also connected to FAIS, no matter where it is located, raises the potential of not having a disconnect. Additionally in their estimate, VDA does not include any effort for COINS within the disconnect project.

In examining Mr. Hall's plan and accepting the VDA caveats, ISO believes that the disconnect effort should get moving immediately. The issue of loss of the FAIS numbered access can immediately be solved by the installation within INR, of standard Department FAIS terminals.

The next logical step would be for INR to layout a project schedule and tasking that accomplishes disconnect as rapidly as possible. Part of the schedule should include acquisition and installation of FAIS equipment within INR. The schedule and

- 2 -

it's implementation would be the responsibility of INR as the project manager for the team. ISO will provide access to our DEC support contract vehicle for procurement of the development team and hardware. We also believe it is critical that we serve as a consultant to the process in the interest of the Department. In the longer term, we need to have dedicated ISO resources to fulfill this role and to work with INR to define this relationship.

With the assurances of a proper and timely disconnect, ISO stands ready to discuss with INR enhancements and revised plans. We believe such discussions need to be taken within the framework of longer-term INR strategic planning.

TECHNICAL EVALUATION

OF INR

DISCONNECT OPTIONS

Prepared by J.G. Van Dyke & Associates
11 September 1985

TABLE OF CONTENTS

SECTION 1. GENERAL

1.1 Introduction and Background.

The INR message handling system was first developed in the mid 1970s to provide an automated means of receiving, analyzing, and disseminating message traffic of interest to the U.S. Department of State.

The current equipment environment uses DEC 11/70 hardware to provide the analysis, storage, and retrieval functions. IBM 3083 hardware is used to provide the profiling and mailbox functions.

A recent decision to terminate the DEC to IBM connection has required that disconnect options be defined and analyzed. A final option selection must be made soon to meet implied cutoff deadlines.

The selected option should be viewed as having a 3 to 5 year life cycle since community standard solutions to message handling requirements are currently being developed and implemented.

There are two types of solution options that are reasonable. First, the current IBM environment could be duplicated or reconstructed inside the INR equipment area. This would allow transportation of the existing software from the IBM 3083 with minimal or no software development costs.

The second type of solution is to develop software to perform the profiling function on DEC equipment.

1.2 Objectives.

The objective of this study is to provide a technical evaluation of the alternative means of providing a disconnect between the INR message handling system and the IBM 3083 system.

Each alternative will be evaluated based upon the following items:

    o Technical merit
    o Manpower development requirements
    o Hardware requirements
    o Risk
    o Expansion
    o Reliability
    o Time to implement

The primary requirement is to provide an alternate means of providing current INR system capabilities. Although such alternatives may provide the potential for added functionality, these capabilities are considered secondary to the immediate requirement of providing for current operational functionality and are therefore outside the scope of this study.

Hardware costs are more predictable and therefore a hardware solution will present a lower risk alternative then an alternative requiring a large amount of software development.

SECTION 2. TECHNICAL EVALUATION

2.1 Proposed Methods and Procedures.

The following sections (2.1.1, 2.1.2, and 2.1.3) represent three of the most viable solutions to solving the current communications problem. In discussing each solution, five different factors have been considered, they are:

Equipment Impacts - The replacement equipment is introduced in terms of minimum hardware configurations required to accomplish the task. This paragraph also introduces the related environmental conditions which accompany the replacement hardware (power, size, and heat).

Software Impacts - Any solution requiring a different hardware and operating system architecture from what currently exists on the IBM 3083 will require code modifications (see section 2.2). Figure 2-1 presents a pictorial view of why it is often important to choose a replacement solution which requires little of no software modification.

Manpower Impacts - This paragraph presents the staffing requirements introduced by the various solutions for the transfer of software and code modification where applicable. In particular, this portion states the required skill sets and capabilities for a successful transition.

Operational Impacts - This paragraph presents the staffing requirements introduced by the various solutions for the day-to-day operation of the system after transition. Factors such as skill sets and capabilities are discussed, along with the necessary training involved.

Development Impacts - Development considerations include enhancement and expansion. The system is currently tasked with an interface expansion into the COINS network. This task requires code development and is discussed along with future requirements in reference to feasibility and ease of enhancement with respect to the proposed operating environments.

Each of the five factors discussed for the various solutions serve to represent the total picture in evaluation for the most effective and efficient transition plan. In the paragraphs introducing equipment impacts, hardware costs were derived strictly for a comparative basis. The Department has been left to decide the weight of each factor and therefore the success potential of the recommended transition plan presented in Section 3.

2.1.1 DEC 11/84 Solution.

The material in this section pertains to using Digital Equipment Corporation (DEC) 11/84 computers. It should be noted at this point, that the acquisition of 11/84s, is the only proposed solution which also enables the main system (now running on DEC 11/70 computers), to be memory upgraded so that it can run the entire compliment of IHS software.

Equipment Impact - The replacement equipment needed for this solution consists of the following hardware:

Item	Approximate Price
3 Terminals	3,500
2 11/84 Computers (2 meg ea)	40,000
6 Disk Drives (On-line Store)	112,000
EQUIPMENT TOTAL	155,500
Vendor Operations Software	4,000
GRAND TOTAL	159,500

The DEC tape drives (Off-line storage) used for the current INR system can be connected to the 11/84s at no additional hardware expense.

The total operating power required by the 11/84s and peripheral devices is estimated at 3,996 watts. Due to the fact that this solution entails replacement of the existing 11/70 computers using 18,400 watts, a net savings will occur of roughly 14,404 watts.

The size of the 11/84s are roughly the same as the 11/70s they will replace. The most significant savings is in the amount of heat they generate. Less heat means less tonnage of air conditioning. The following table presents the comparison:

UNIT OF MEASURE	11/70	11/84
Height	72"	41.7"
Width	22"	21.3"
Depth	30"	31.5"
Weight	500 lbs.	400 lbs.
BTUs	7,309	3,519

Software Impact - The operating system proposed with the 11/84s is RSX11m PLUS. The code to accomplish the IBM task under this solution would be written with a C compiler. The software proposal of developing 3 program modules is a workable solution. We see no technical or operational problems. The proposed profiling logic should be more efficient than the current profiling function running on the IBM 3083. This is simply because software developed today can take advantage of current storage and CPU technology, and the removal of the need to transfer data between two CPUs reduces overhead.

Manpower Impact - The level of labor involved has been estimated by INR at three individuals for a six month period. This estimate included the following personnel:

    Contracted Manpower -

       1 person from ISN for six months
       1 person from DEC for six months

    Government Manpower -

       1 person from INR for six months

This estimate was based upon the availability of Mr. Hall from ISN, Mr. Moore from DEC, and Mr. Walker from INR. Mr. Moore is not available and represents the loss of a very experienced development resource.

We feel that a team of 3 persons will require 8 months to accomplish the effort. The development work is such that a team of 4 could be efficiently used and could accomplish the work in 6 months. It is further thought that a team of four is the maximum efficient development team. A larger team would not necessarily finish sooner. The individuals performing the software development required under this solution should have a thorough working knowledge of RSX11m PLUS, C language, and RMS. They should have prior experience with DEC internals and communications processes, and if possible should be intimately familiar with the current INR system Input/Output (I/O) characteristics. They must have active clearances at the TS/SI level.

The above estimate includes time to develop the necessary software on the proposed DEC equipment, install, test, document and train operations staff as necessary. It does not include time to develop the COINS connection software. Existing access to D.O.S. traffic can be provided using terminals connected to the IBM hardware in ISO. Therefore the PRO 380 hardware is not necessary to replace functionality affected by the disconnect.

Operational Impact — This solution will require a
part-time/full-time on site operations individual. The
individual will be responsible for system
initialization, backup and recovery, and error
resolution. This position requires a knowledge
of RSX11m PLUS tape and disk drive operations and
DEC utilities for system management, memory management,
and system tuning. This position requires an active
TS/SI clearance. The existing staff capabilities
will fulfill these requirements.

Development Impacts — The current COINS interface task
will be implemented with the use of DEC PRO 380
microcomputers. PRO 380s operate under both the POS
and RSX11m operating systems and enable built-in file
transfer and communications capability to the 11/84s.
The INR software can be easily modified to provide
access to DOS message traffic using the 11/84 hardware.

2.1.2 IBM 4361-M05 Solution.

This section is an analysis of the capabilities of the IBM 4361 computer. The 4361 was selected because it is downward compatible with the 3083. This option will cause additional devices to be added to the INR area for the express purpose of running the current 3083 tasks.

Equipment Impact - The additional equipment needed for this solution consists of the following hardware:

Item	Approximate Price
3 Terminals (3179)	3,531
1 4361 Computer (8 meg)	163,746
2 Disk Drives (On-line Store)	183,295
1 Console (3205)	1,737
1 Tape Drive (3430)	30,394
1 Printer (3268)	4,527
TOTAL	387,230

The tape drive (Off-line storage) used for this solution could eliminated if a switch to the ISO tape drive could be installed.

The total operating power required by the 4361 and peripheral devices is estimated at 11,140 watts. Due to the fact that this solution entails additional equipment in the INR area this figure represents a net increase of power.

The size of the 4361 is listed below. The amount of heat generated may necessitate an increase in tonnage of air conditioning. The following table presents the statistics:

UNIT OF MEASURE	4361
Height	40"
Width	63"
Depth	32"
Weight	3,707 lbs.
BTUs	30,842

Software Impact - The operating system proposed with the 4361 is MVS. The code to accomplish the IBM task under this solution would be recompiled with version 2.0 H Assembler. COBOL code would be recompiled using the COBOL compiler.

Manpower Impact - The level of labor involved has been estimated at three individuals for a four month period. This estimate included the following personnel:

Contracted Manpower -

2 persons from IBM for four months

Government Manpower -

1 person from INR for four months

This estimate was based upon the need for an INR representative to understand the function of the code.

We feel that 12 man-months of effort will be required to accomplish the software conversion necessary.

The three employees proposed to perform the software conversion required under this solution should have a thorough working knowledge of MVS, H Assembler, and COBOL. They should have prior experience with IBM internals and DEC to IBM communications processes. They should also have an understanding of the current INR system Input/Output (I/O) characteristics. They must have active clearances at the TS/SI level. The existing staff capabilities will not fulfill these requirements.

Operational Impact - This solution will require a part-time/full-time on site operations individual. The individual will be responsible for system initialization, backup and recovery, and error resolution. This position requires detailed knowledge about MVS tape and disk drive operations and IBM utilities for system management, memory management, and system tuning. This position requires an active TS/SI clearance. The existing staff capabilities will not fulfill these requirements.

Development Impacts - The current COINS interface task will be implemented with the use of DEC PRO 380 microcomputers in communication with the 11/70s. There will be no interface to the IBM 4361.

2.1.3 IBM 4381 Solution.

This section is an analysis of the capabilities of the IBM 4381 computer. The 4381 was selected because it is downward compatible with the 3083 and is capable of running MVS XA. MVS XA will provide a common operating system to both INR and ISO. This option will cause additional devices to be added to the INR area for the express purpose of running the current 3083 tasks.

Equipment Impact – The additional equipment needed for this solution consists of the following hardware:

Item	Approximate Price
3 Terminals (3179)	3,531
1 4381 Computer (8 meg)	313,746
2 Disk Drives (On-line Store)	183,295
1 Console (3205)	1,737
1 Tape Drive (3430)	30,394
1 Printer (3268)	4,527
TOTAL	537,230

The tape drive (Off-line storage) used for this solution could eliminated if a switch to the ISO tape drive could be installed.

The total operating power required by the 4381 and peripheral devices is estimated at 22,140 watts. Due to the fact that this solution entails additional equipment in the INR area this figure represents a net increase of power.

The size of the 4381 is listed below. The amount of heat generated may necessitate an increase in tonnage of air conditioning. The following table presents the statistics:

UNIT OF MEASURE	4381
Height	71"
Width	65"
Depth	32"
Weight	4,000 lbs.
BTUs	36,400

Software Impact – The operating system proposed with the 4381 is MVS XA. The code to accomplish the IBM task under this solution would be recompiled with version 2.0 H Assembler. COBOL code would be recompiled using the COBOL compiler.

Manpower Impact - The level of labor involved has been estimated at three individuals for a four month period. This estimate included the following personnel:

Contracted Manpower -

2 persons from IBM for four months

Government Manpower -

1 person from INR for four months

This estimate was based upon the need for an INR representative to understand the function of the code.

We feel that 12 man-months of effort will be required to accomplish the software conversion necessary.

The three employees proposed to perform the software conversion required under this solution should have a thorough working knowledge of MVS XA, H Assembler, and COBOL. They should have prior experience with IBM internals and DEC to IBM communications processes. They should also have an understanding of the current INR system Input/Output (I/O) characteristics. They must have active clearances at the TS/SI level. The existing staff capabilities will not fulfill these requirements.

Operational Impact - This solution will require a part-time/full-time on site operations individual. The individual will be responsible for system initialization, backup and recovery, and error resolution. This position requires detailed knowledge about MVS XA tape and disk drive operations and IBM utilities for system management, memory management, and system tuning. This position requires an active TS/SI clearance. The existing staff capabilities will not fulfill these requirements.

Development Impacts - The current COINS interface task will be implemented with the use of DEC PRO 380 microcomputers in communication with the 11/70s. There will be no interface to the IBM 4381.

2.2 Assumptions and Constraints.

The technical solutions discussed in Section 2.1 were arrived at due to a number of assumptions and constraints. The major constraint is that there is not adequate information about the number of programs, memory used, and disk storage utilized on the IBM 3083 as it pertains to the current system. It is not quite clear whether or not this information can be acquired at all. In order to side step this constraint, an estimate was made of the programs needed to fulfill the IBM portion of the system and the following assumptions were drawn:

Software Needed -

Profiles Administration Task
Message Profiling Task
Files Handling Task
Communications Task

Memory Needed -

Approximately 1 Megabyte

On-line Storage Needed -

10 - 20 Megabytes

Off-line Storage Needed -

1600 BPI Tape Unit

The 4361 and 4381 were proposed in order to introduce solutions requiring little or no code modification to software that already exists. An assumption was made in this case, that the current system software can be copied to the new hardware, recompiled, and run without needing additional 3083 capabilities. If the 3083 code does more than just INR specific tasks, a programmer will be required to learn the programs and extract only the required code. This effort could take longer than rewriting the code from scratch.

SECTION 3. TECHNICAL RECOMMENDATION

It is recommended that the DEC 11/84 approach be accepted and implemented. The following discussion highlights the points of consideration in making this recommendation.

o The DEC solution will allow INR to replace the equipment they have now, perform the 3083 tasks, and permit them to run all their current software without needing additional space, power or air conditioning. Both IBM solutions would require additional space, power, and air conditioning.

o The cost saving is more than 50% of the next best alternative.

A comparison summary is listed below:

	DEC 11/84	IBM 4361	IBM 4381
Equipment Cost	173,500	387,230	537,230
Space (sq ft)	No Change	Add 24	Add 24
Power (watts)	Less 14,000	Add 11,140	Add 22,140
A/C (BTUs)	Less 3,800	Add 30,000	Add 36,000
Labor	Available	Must Acquire	Must Acquire

Preparation for conversion of the profiling functions has already taken place. INR and ISN personnel have worked with the DEC resident to provide the necessary environment for installation of the Record Management System (RMS). They have a working knowledge of this vendor supplied software and have designed the files necessary to implement the profiling logic. The same is true of the RSX11m PLUS operating system and the PRO 380s. With this work accomplished it is felt that all software components can be implemented within 24 months assuming that Mr. Hall (ISN), and Mr. Walker (INR) are tasked on the development task thereby providing an indepth knowledge of the current INR system.

All points considered, the majority of the required manpower necessary to accomplish the software conversion are in place and familiar with the situation. Assuming the new DEC resident will be in place soon, the development team will be able to start work with a minimum of start up delay.

The DEC 11/84 solution is compatible with the hardware used by the intelligence community for similar message handling and analysis systems. The MAXI system is 11/70 based hardware; the Communications Service Processor (CSP) is 11/44 based; and COINS is 11/70 based. DEC to DEC communications protocols are readily available and easily installed. This could be of value if future requirements necessitated connection to outside agencies.

The DEC 11/84 option provides adequate processing and storage capability for current as well as anticipated future enhancements. The cost ($195,000) is the least expensive of the options considered. The DEC solution can provide for the COINS connection.